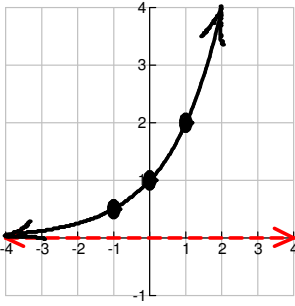
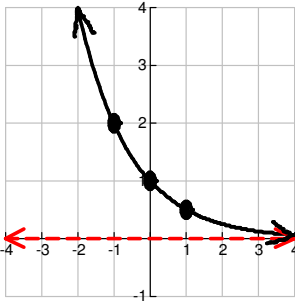


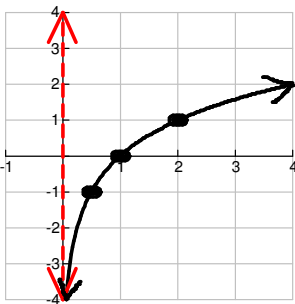
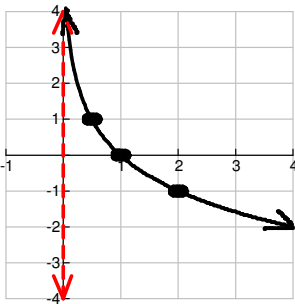
4.2 – Exponential and Logarithmic Functions

Exponential / Logarithmic Functions and Their Characteristics

– **exponential function** → a function in the form _____ where $b > 0$, $b \neq 1$, and x is IR.

Exponential Function's Characteristics		Graphs of Exponential Functions	
Domain: _____	Range: _____	a.) Graph of $y = (2)^x$ Graph: $y = (2)^{x+1} + 2$	b.) Graph of $y = (\frac{1}{2})^x$ Graph: $y = (\frac{1}{2})^{x-2} - 1$
Common Pt: _____	Asymptote: _____		
Transforming Exp Graph: $y = b^{(x \pm c)} \pm d$			
a.) # is on "outside" → + d: _____ – d: _____			
b.) # is on "inside" → + c: _____ – c: _____			
c.) Domain of Transform Graph: _____			
d.) Range of Transform Graph: _____			

– **logarithmic function** → a function in the form _____ where $b > 0$, $b \neq 1$, and x is IR.

Logarithmic Function's Characteristics		Graphs of Logarithmic Functions	
Domain: _____	Range: _____	a.) Graph of $y = \log_2(x)$ Graph: $y = \log_2(x+1) - 3$	b.) Graph of $y = \log_{1/2}(x)$ Graph: $y = \log_{1/2}(x-2) + 2$
Common Pt: _____	Asymptote: _____		
Transforming Log Graph: $y = \log_b(x \pm c) \pm d$			
a.) # is on "outside" → + d: _____ – d: _____			
b.) # is on "inside" → + c: _____ – c: _____			
c.) Domain of Transform Graph: _____			
d.) Range of Transform Graph: _____			

Example 1: State the asymptote, domain, and range of each given function using interval notation.

Given Exp / Log Function	Asymptote	Domain	Range
a.) $f(x) = 4^{x-3} + 5$			
b.) $f(x) = \log_3(x+4) - 3$			
c.) $f(x) = (\frac{1}{3})^{x+5} - 2$			
d.) $f(x) = \ln(x-4) + 1$			

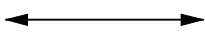
Properties of Logarithmic Functions

Basic Log Property (Hamburger Helper Hand) → helps to convert from LOG form to EXP FORM



Logarithmic Form

$$\log_b y = x$$



Exponential Form

Example 2: Convert

a.) $\log_2 8 = 3 \leftrightarrow$ _____

b.) _____ $\leftrightarrow 5^4 = 625$

Laws of Logarithms

→ Law # 1: _____

Law # 2: _____

Law # 3: _____

Example 3: Evaluate each expression or find the value of x.

a.) $\log_3 9 = x$	b.) $\log_4 8$	c.) $\log_2 \left(\frac{1}{16} \right) = x$	d.) $\log_8 \left(\frac{1}{256} \right)$
e.) $\log_{36} \sqrt{6}$	f.) $\log_x 5 = \frac{1}{3}$	g.) $\log(100)^4$	h.) $\ln \left(\frac{1}{e^3} \right)$
i.) $\log_2 112 - \log_2 7$	j.) $\log_{12} 9 + \log_{12} 16$	k.) $e^{3 \ln 2 - \ln 4}$	l.) $\log \sqrt{\frac{1}{10}}$